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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,666	02/23/2004	Raymond Lee Lavoie JR.	03012US	2681

61611 7590 07/12/2006

ROHM AND HAAS ELECTRONIC MATERIALS
CMP HOLDINGS, INC.
451 BELLEVUE ROAD
NEWARK, DE 19713

EXAMINER	
MULLER, BRYAN R	

ART UNIT	PAPER NUMBER
3723	

DATE MAILED: 07/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/785,666	LAVOIE ET AL.	
	Examiner	Art Unit	
	Bryan R. Muller	3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claim 6 is objected to because of the following informalities: the claim contains the limitation "the thermoplastic polymer", which is not listed in the independent claim 1, from which claim 6 depends. It is assumed by the examiner that the applicant is intending to refer to the PVA, which was listed in a Markush group of thermoplastic polymers in the original claims. Thus, it is suggested by the examiner that the applicant replace the term "thermoplastic polymer" in claim 6 with the term "polyvinyl alcohol". Appropriate correction is required.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuchiya et al (Pub. No. 2002/0035872) in view of Kurata (2003/0219982).

3. In reference to claim 1, Tsuchiya discloses a chemical mechanical polishing (CMP) slurry (CMP process commonly used for polishing semiconductor substrates) that comprises a thickener in an amount of 0.001-0.05 wt% (overlaps claimed range) that may be Polyvinylpyrrolidone (PVP), 0.0001-5 wt% (within claimed range) benzotriazole as an (corrosion inhibitor) antioxidant (paragraphs 50 and 51), 0.01-5 wt%

(within claimed range) citric acid as a (complexing agent) oxidation aid (paragraphs 44-48), 0.01-15% (overlapping claimed range) hydrogen peroxide as an oxidizer (paragraphs 30 and 31), and 0.1-50 wt% and more preferably 1-10 wt% silica abrasive, as discussed supra, with a pH in the range of 3-9 or more preferably 4-8 (overlapping claimed range, paragraph 52) but Tsuchiya fails to disclose that the composition also comprises polyvinyl alcohol. Kurata discloses a CMP slurry and teaches that the addition of a water-soluble polymer in combination with a protective film forming agent to provide an etching-suppression effect, which is a desirable trait, and further teaches that the polymer may be polyvinyl alcohol (PVA) in an amount of 0.001 to 0.3 weight% and more preferably in an amount of 0.003 to 0.1 weight% (paragraph 49). Kurata further discloses that the protective film-forming agent may be benzotriazole (paragraph 35). Therefore it would have been obvious to on e of ordinary skill in the art at the time the invention was made to provide the Tsuchiya slurry with 0.001-0.05 wt% PVP as a thickener and to add 0.001-0.3 weight % PVA to the slurry that will react with the benzotriazole to provide an etching-suppression effect, as taught by Kurata. The portion of the claim that discloses that increasing the weight ratio of the PVA to the PVP decreases the polishing removal rate of the non-ferrous interconnect is merely stating an inherent property that is found in the claimed composition and because the combination of the references makes obvious a composition having the claimed elements within the claimed ranges, the composition disclosed in the obvious combination will also inherently exhibit the same property. Therefore, it further would have been inherent that increasing the weight ratio of the PVA and PVP would decrease

the removal rate of the semiconductor substrate. The ranges provided are competent rejections based on MPEP § 2131.03 [R-2] - PRIOR ART WHICH TEACHES A RANGE WITHIN, OVERLAPPING, OR TOUCHING THE CLAIMED RANGE ANTICIPATES IF THE PRIOR ART RANGE DISCLOSES THE CLAIMED RANGE WITH "SUFFICIENT SPECIFICITY".

4. In reference to claim 2, Tsuchiya discloses that the molecular weight of the thickener (PVP) is in the range of 10,000-5,000,000 and more preferably 50,000-2,000,000, which would inherently produce a range of weight average molecular weight that would overlap the claimed range of 1,000 to 250,000 grams per mole.

5. In reference to claim 3, Tsuchiya discloses that the abrasive particles include silica particles (paragraph 27).

6. In reference to claim 4, Kurata discloses that the weight average molecular weight of the thickener (PVA) is in the range of no less than 500 and more preferably no less than 5,000 (paragraph 49), which produces a range of weight average molecular weight that would overlap the claimed range of 1,000-1,000,000 grams per mole. It would have been obvious that the degree of hydrolyzation of the PVA would be at least 20 mole percent because the PVA will be within a fluid mixture comprising a large majority of water (paragraph 26) based on the composition percentages provided for other contents of the slurry.

7. In reference to claim 5, Tsuchiya discloses that the molecular weight of the thickener (PVP) is in the range of 10,000-5,000,000 and more preferably 50,000-

2,000,000, which would inherently produce a range of weight average molecular weight that would overlap the claimed range of 1,000-1,000,000 grams per mole.

8. In reference to claim 6, the percentage ranges of PVP (0.001-0.05%) and PVA (0.001-0.3%) that will be present in the slurry, as discussed supra, provide a possible ratio range of 1:300 (.001%PVP:0.3%PVA) to 50:1 (0.05%PVP:0.001%PVA), which overlaps the claimed range (see MPEP § 2131.03 [R-2]).

9. In reference to claim 7, Tsuchiya discloses a polishing composition comprising 0.001-.05 wt% PVP (within claimed range) with a weight average molecular weight of 500 to 5,000 grams per mole (overlaps claimed range), 0.0001-5 wt% (within claimed range) benzotriazole as an (corrosion inhibitor) antioxidant (paragraphs 50 and 51), 0.01-5 wt% (within claimed range) citric acid as a (complexing agent) oxidation aid (paragraphs 44-48), 0.01-15% (overlapping claimed range) hydrogen peroxide as an oxidizer (paragraphs 30 and 31), and 0.1-50 wt% and more preferably 1-10 wt% silica abrasive, as discussed supra, with a pH in the range of 3-9 or more preferably 4-8 (overlapping claimed range, paragraph 52), as discussed supra. Also, as discussed supra, it would have been obvious to include PVA in a range of .001-0.3 weight% (overlapping range) with a weight average molecular weight of 50,000 to 2,000,000 grams per mole (overlaps claimed range) and it would have been inherent that increasing the weight ratio of PVP to PVA will decrease the removal rate, as discussed supra.

15. In reference to claim 8, in view of the obvious alteration to the slurry of Tsuchiya in view of the teachings of Kurata, as discussed supra, it would be obvious to use the

modified slurry (of claims 1 or 7) in the method disclosed by Tsuchiya, which provides the steps of applying a polishing composition to a semiconductor substrate and polishing the semiconductor substrate at a given pad pressure and it again would have been inherent that increasing the weight ratio of PVP to PVA would decrease the removal rate, as discussed supra. Tsuchiya discloses an example wherein the pad pressure is 27.6 kPa but it would have been obvious, through routine experimentation, to one of ordinary skill in the art at the time the invention was made to vary the polishing pad pressure in order to achieve a desired removal rate.

16. In reference to claim 9, it would have been obvious that the variation of the weight ratio of PVP and PVA, pad pressure, polishing speed, and slurry supply rate would be able to provide a removal rate within the range of 150 Angstroms/min or less.

17. In reference to claim 10, Tsuchiya discloses a removal rate of 400-1,500 nm/min, which is equivalent to 4,000-15,000 Angstroms/min, which falls within the claimed range of 150 Angstroms/min or more. It further would have been obvious that the variation of the weight ratio of PVP and PVA, pad pressure, polishing speed, and slurry supply rate would be able to provide a removal rate within the range of 150 Angstroms/min or more.

Response to Arguments

18. Applicant's arguments filed 4/25/2006 have been fully considered but they are not persuasive.

19. The applicant first argues that the Kurata reference teaches that PVA increases polishing removal rate. However, as discussed supra (in the rejection to claim 1), the

claim that increasing the weight ration of PVA to PVP decreases the polishing removal rate is merely disclosing a property of the claimed composition that must be inherent. Thus, the obvious combination of Tsuchiya and Kurata to make the combination as claimed, would also inherently, comprise the same properties. Further, the disclosure of Kurata that PVA increases removal rate is only tested in the polishing composition of Kurata, which is different that the polishing composition of Tsuchiya, to which the PVA is added in view of the advantages taught by Kurata. Also, the disclosure of Kurata only shows that a composition having PVA has a higher polishing removal rate than a composition with no PVA but does not show the effects that different amounts of PVA within the composition would have. Therefore, the Kurata disclosure does not effectively dis-prove that increasing PVA would always increase polishing removal rate. Also, the applicant addresses the belief that the Kurata reference teaches that an increase in PVA would not decrease the polishing removal rate but an increase in the ratio between PVP and PVA could also include a decrease in PVP, which is not addressed by the applicant as to the effect of decreased PVP on the polishing removal rate.

20. The applicant also argues that neither Tsuchiya nor Kurata disclose the benefits achieved with a combination of PVA and PVP. The examiner agrees that the references do not disclose the same benefits that the applicant suggests in their specification. However, the Tsuchiya reference does teach specific benefits achieved by using PVP as a thickening agent and Kurata discloses the specific benefits achieved when using PVA in combination with benzotriazole, which is also found in the Tsuchiya

reference, thus providing the motivation to add PVA to the Tsuchiya composition. Therefore, the Tsuchiya reference, once combined the Kurata reference do disclose, although different than the advantages disclosed by the applicant, advantages that are achieved by providing a composition having PVA and PVP.

21. The applicant further argues that the applicant did not understand the statement "It further would be inherent that increasing the weight ratio of the PVA and PVP would decrease the removal rate of the semiconductor substrate because any change in the etching suppression effect, would inherently have an effect on removal rate". Due to the amendments to the claim to clarify that the "**polishing** removal rate" is affected as opposed to etching rate, this statement has been removed and replaced with a statement to clarify the inherency of the compositions property.

22. Finally, the applicant argues, with regard to claim 6, that the combined references do not suggest the claimed ratio of the PVP to PVA. However, the examiner agrees that the values provided in the previous rejection were inaccurate, but the correct ranges for the PVP and PVA, as disclosed by Tsuchiya and Kurata, respectively, do provide a ratio range that overlaps the applicant's claimed ratio range, as discussed supra in the rejection of claim 6.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Choi et al (2003/0139127) discloses a CMP slurry with PVP or PVA and teaches a range of weight average molecular weight similar to the claimed

ranges and Sachan (6,616,717 and 6,699,299), Wake (6,436,811 and 2002/0037642), Thomas (2002/0019202), Ishibashi (2003/0121214), Dauguet (4,222,747), Sasaki (5,352,277), Costas (6,443,812) and Tsuchiya (6,530,968 and 2001/0005009) all disclose polishing compositions with either PVA, PVP or both and posses other similarities to the claimed composition and Nojo (6,443,811) discloses advantages to providing about 0.01-1weight% of PVA to CMP slurries.

24. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan R. Muller whose telephone number is (571) 272-4489. The examiner can normally be reached on Monday thru Thursday and second Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J. Hail III can be reached on (571) 272-4485. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRM BRM
6/29/2006

Joseph J. Hail, III
Supervisory Patent Examiner
Technology Center 3700